

25. The method of claim 24 wherein ^{AB} said recorded position data is converted to absolute coordinates by the ground-based data retrieving station by adding the ^{AB} first recorded difference to the ^{AB} initial coordinates resulting in the ^{AB} first absolute coordinate and then adding to it the ^{AB} next recorded difference to produce the ^{AB} second absolute coordinate and so on, wherein said initial coordinates are recorded at the start of every flight.
26. A method of periodically recording aircraft position and flight data at a certain time interval which is set before the ^{AB} start of every flight by transmitting the ^{AB} desired interval to the flight data recorder using the wireless communications device of claim 21.
27. The method of claim 26 wherein the ^{AB} said recording time interval can be automatically varied in-flight depending on aircraft speed by:
- computing the speed of the aircraft by estimating the distance traveled between two points and dividing by the time traveled;
 - 5 comparing said speed with pre-set values to determine if the aircraft is taxiing, cruising or taking-off or landing;
 - setting the time interval to the ^{AB} highest value if the speed is equivalent to
 - 8 taxiing, intermediate value if cruising and the ^{AB} lowest value if taking off or landing.

REMARKS – General

By the above amendment, the applicant has corrected the Specifications as pointed out by the Examiner and has cancelled some of the claims and rewritten the others to overcome the technical rejections and to emphasize the invention's novelty and uniqueness over the prior art.

The Objection to the Abstract and Specification

The specification was objected to under MPEP 608.01(b) since the invention discloses that it does not interface with any of the aircraft instruments while the diagrams show otherwise. The applicant has made the necessary correction by the above amendment by being more specific and stating that the invention does not interface to aircraft flight instruments, (such as the airspeed indicator, attitude indicator, altimeter) since the invention has its own sensors for

these functions. The Description of Preferred Embodiment has also been corrected in this regard by stating that the antennas and accessories are not contained in the flight recorder enclosure.

The Objection to Claim 7 under 37 CFR 1.75 (c)

The claim was objected to for being improper in form. Claim 7 has been cancelled due to changes made on the other claims.

Claim Rejections under USC 112

Claim 16 was rejected since it was not sufficiently explained in the specification. In page 21 of the application, 3rd paragraph, it states "In the computer 32 of the data retrieval unit, the absolute coordinates are determined by adding the existing delta to the previous absolute coordinate". This clearly explains how the absolute coordinates are computed. The "delta" mentioned was explained in the 2nd paragraph of the same page: "A data record contains the GPS location data consisting of differences in coordinates between previous and current readings or deltas". Claim 16 has been re-written as Claim 24 to more clearly explain the method.

Claims 4 and 13 were rejected since it mentions items without antecedent basis. Claim 4 has been cancelled while claim 13 has been rewritten as claim 25.

Claim Rejections under USC 102

Claims 1-3, 5, 8-14, 16 were rejected as being anticipated by Bateman.

Claims 1 and 2 have been re-written as claims 18 and 19 to emphasize one of the unique features of the invention which is being able to perform most of the flight recording and monitoring functions in a single physical unit. While the devices found in this invention may also be found in Bateman's, the present invention integrates almost all the different devices into a single physical piece of equipment. Bateman's patent describes cameras, flight performance sensors, a GPS receiver, cellular telephone links, a flight event recording monitor which are all physically separate units linked to each other as shown in Fig. 1 and Fig. 2 of Bateman. The

present invention is less costly to implement making it highly applicable to small aircraft. Bateman's invention was designed for large aircraft.

Claim 3 has been re-written as claim 20 to further point out the ease in installing the invention in an aircraft. Bateman's invention consists of a large number of separate devices which have to be installed in various parts of the aircraft. The installation effort for such a system is much greater and costlier. The present invention only requires bolting a small box to the aircraft's floor, taping antennas to the windshield, installing the temperature sensor and connecting a few wires to the aircraft's power system and ignition switch. The approximate cost and difficulty in installing Bateman's invention is equivalent to that of the present invention times the number of different equipment which is around 8 or 9 as per Fig. 1 and Fig. 2 of Bateman.

Claim 5 has been cancelled.

Claim 8 has been re-written as claim 21 to emphasize that the wireless data retrieval system of the current invention is simpler, less costlier and different from Bateman's. Bateman discloses a system which communicates with a ground station while in flight using cellular phone links and a global satellite communications system. These are expensive to operate and are not practical for small general aviation aircraft. The current invention transmits data only at the end of each flight and the data communications transceivers are low-power, short range devices integrated into the flight data recorder unit to reduce cost.

Claim 9 has been re-written as claim 22 to be more specific about portability since this term refers to fact that the ground receiving station can also be a hand-held device (such as a Personal Digital Assistant with a transceiver module), as compared to Bateman's ground receiving stations which, as shown in Fig. 1 of Bateman, appear to be fixed stations.

Claim 10 has been re-written as claim 23 to be more specific about the invention's underwater communications capability. This refers to the ability of the invention to transfer data from the flight data recorder to the data retrieval unit even if the aircraft is underwater, such as after an accident, without having to physically retrieve the flight data recorder. The preferred

embodiment of this feature is shown in Fig. 9B and described in the specifications. Neither Bateman nor the other prior art has this feature.

Claim 11 has been cancelled.

Claim 12 has been re-written as claim 24 to be clearer in describing the method being disclosed. GPS receivers periodically generate position information as longitude and latitude coordinates consisting of 9 bytes each. Instead of recording these coordinates, the current invention computes the difference between the present and previous coordinates and records the difference instead. This consists only of 4 bytes, thus generating more than 50% saving on memory space, lowering further the cost of the invention. This method is not described in Bateman.

Claim 13 has been re-written as claim 26 to be more specific in describing the method being disclosed. The invention records position and sensor information at a regular time interval, say every second or every 4 seconds. This time interval can be set by transmitting operating parameters to the flight data recorder using the data retrieval unit at the start of the flight. Bateman's method does not record data at regular intervals, it does so only when there are changes in the data stream. Defining these "changes" can be very tricky and it will be possible for certain vital data to be lost.

Claim 14 has been re-written as claim 27 to be clearer in describing the method being disclosed. The flight data recorder can automatically vary the recording interval based on aircraft speed as shown by the flowchart of Fig. 14B of the specifications. If the speed is very low as in taxiing, this is not a critical stage in the flight so the recording interval can be high. If the speed is between cruising and taxiing, this is a crucial stage in the flight so the recording interval is set to the lowest value so that more information is captured. During cruising there is not much activity so the interval is set to a medium value. This method optimizes memory usage without losing information during critical stages of the flight. Bateman or the other cited references do not describe this method.

Claim 16 has been re-written as claim 24 to be clearer in describing the method being disclosed. Unlike Bateman, the flight data recorder does not scramble or descramble data. It merely stores the differences of absolute coordinates with the objective of conserving on memory space and reducing data retrieval transmission time. These are factors that contribute to the cost of the invention. Lowering this cost to make it affordable to general aviation aircraft owners is one of the invention's main objectives. Bateman is solving a different problem.

Claim rejections under USC 103

Claims 4 and 6 were rejected as being unpatentable over Bateman in view of Clavelloux et al. Claims 4 and 6 have been cancelled.

Claim 15 was rejected as being unpatentable over Bateman in view of Wright et al. Claim 15 has been cancelled.

Claim 17 was rejected as being unpatentable over Bateman in view of Jiang. Claim 17 has been cancelled.

Conclusion

While Flight Data Recorders have been in use in large aircraft, particularly airline jets, for the past 3 or 4 decades, small general aviation aircraft have been flying without the benefits of these data recorders since the beginning of modern aviation. This invention solves a long-felt, long-existing but unsolved need.

For all the reasons given above, applicant respectfully submits that the errors in the specifications are corrected, the claims comply with section 112, the claims define over the prior art under Section 102 and the claimed distinctions are of patentable merit under Section 103. Accordingly, applicant submits that this application is now in full condition for allowance, which applicant respectfully solicits.

Very respectfully,



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